

R E M A R K S

Information Disclosure Statement

The Examiner is respectfully requested to return a copy of the IDS Form filed on October 16, 2008, and to indicate thereon that the cited publications were considered and made of record.

Drawings

The Examiner is respectfully requested to approve the drawings.

Claim Amendments

Claims 36, 47, 54 and 64 were amended to include a feature from previous claim 46 ("disposed at an internal portion...which is brought into contact with the molten steel"); a feature from previous claim 59 ("carbon in the refractory is 40 mass percent or less") and a feature supported on page 55 of the specification in Table 1, No. 12 (15 mass % C).

Claims 39, 41, 74 and 76 were amended to include a feature ("into a sidewall portion") supported on page 31, lines 17 to 22 of the specification and Fig. 5.

Claims 52, 60, 62, 66, 70, 71 and 73 were amended to change the dependency of such claims.

Allowable Subject Matter

Applicants are pleased to report that claim 76 was allowed and that claims 40, 41 and 75 were considered to contain allowable subject matter (see the middle of page 3 of the Office Action).

Anticipation Rejection under 35 USC 102

Claims 36, 37, 46 to 50, 52 to 63 and 77 to 80 were rejected under 35 USC 103 as being unpatentable (obvious) over Nomura et al. (USP 6,279,790) for the reasons set forth on page 2 of the Office Action.

Obviousness Rejection under 35 USC 103

Claims 36 to 39, 42 to 74 and 77 to 80 were rejected under 35 USC 103 as being unpatentable (obvious) over Nomura et al. (USP 6,279,790) in view of Kato et al. (USP 5,616,188) and Hatanda et al. (USP 5,587,101) for the reasons indicated in the paragraph bridging pages 2 and 3 of the Office Action.

It was admitted in the Office Action that Nomura et al do not teach the inclusion of a powdered metal interior of the immersion nozzle or the introduction of gaseous Ar for the desulfurization of molten steel.

Rebuttal of the Prior Art Rejections

Applicants' Claims 36 to 38; 47 to 49; 52 to 57; 60 to 65; and 68 to 73

Nomura et al. clearly teach that the internal portion of the nozzle is made of graphite-less refractory and the carbon content of the refractory thereof should be 5% or less (see the Abstract and column 5, line 56 to column 6, line 3 of Nomura et al.). Therefore, Nomura et al. clearly teach away from applicants' claimed invention, in which at least a part disposed at an internal portion is formed of a refractory including 15 to 40 mass % of C.

Applicants' Claims 39 to 45; 47 to 49; 52 to 57; 60 to 65 and 68 to 74

Firstly, Ar gas is not a gas having a desulfurizing ability. Ar gas is non-reactive ("inert") and therefore is used to simply seal the surface of the nozzle (see page 4, lines 13 to 19 of the

present specification) to prevent  $\text{Al}_2\text{O}_3$  deposition, not as a desulfurizing gas. None of the present specification or any of the cited references teach or suggest that Ar is a desulfurizing gas.

Secondly, Kato et al., and the other cited references, fail to teach or suggest that a gas having a desulfurizing ability is supplied into a sidewall portion of the nozzle.

Applicants' Claims 42 to 45 and 77 to 80

Kato et al., and the other cited references, fail to teach or suggest that an immersion nozzle is formed of a refractory material and a powdered metal having a desulfurizing ability. Kato et al. teach only to add Ca to molten steel, not to a nozzle. This is clear from the description at column 2, lines 50 to 57 and column 1, lines 42 to 46 of Kato et al., for example.

In column 2, lines 50 to 51 of Kato et al., it is disclosed that "Ca treatment is performed after deoxidation by Al." Controlling of a "Ca treatment" does not make any sense if Ca was previously included in the nozzle.

As other evidence of applicants' position,  $\text{Al}_2\text{O}_3$  is formed because of Al addition to the molten steel (column 1, lines 32 to

36 of Kato et al.), and Ca addition changes the inclusions to the CaO-Al<sub>2</sub>O<sub>3</sub> system (column 1, lines 42 to 46 and lines 51 to 54 of Kato et al.). It is reasonable to consider that Ca is added into molten steel.

As further evidence of applicants' position, in column 2, lines 54 to 57 of Kato et al., it is disclosed that "surplus Ca is evaporated and removed by a vacuum treatment." Vacuum treatment is conducted on molten steel, and therefore "surplus Ca" means "surplus Ca in molten steel." If Ca is added to the nozzle, it should be referred to as follows: "Ca seeped into molten metal from the nozzle," not as "surplus Ca."

Applicants' New Claims 80 to 84

Nomura et al. teach that substances such as MgO, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, ZrO<sub>2</sub> and TiO<sub>2</sub> should be 10 wt% or less, noting if they exceed 10 wt%, the melting loss resistance, which is the object of Nomura et al. (see column 3, lines 20 to 23 of Nomura et al.) will be deteriorated (see column 5, lines 25 to 38 of Nomura et al.). Therefore, Nomura et al. teach away from including MgO, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, ZrO<sub>2</sub> and TiO<sub>2</sub> in an amount of 15 to 85 mass percent in the refractory of the nozzle.

Withdrawal of each of the prior art rejections is therefore respectfully requested.

Reconsideration is requested. Allowance is solicited.

An INFORMATION DISCLOSURE STATEMENT is being filed concomitantly herewith.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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Encs.: (1) PETITION FOR EXTENSION OF TIME  
(2) INFORMATION DISCLOSURE STATEMENT